

FORM PTO-1390 (Modified) (REV 11-2000)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		ATTORNEY'S DOCKET NUMBER 112740-514	
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371				U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR 10/031300	
INTERNATIONAL APPLICATION NO PCT/DE00/01109		INTERNATIONAL FILING DATE 11 April 2000		PRIORITY DATE CLAIMED 14 July 1999	
TITLE OF INVENTION HETERODYNE MOBILE RADIO RECEIVER WITH SIMPLIFIED INPUT FILTERING					
APPLICANT(S) FOR DO/EO/US Ralf Schoebel et al.					
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:					
<ol style="list-style-type: none"> 1. <input checked="" type="checkbox"/> This is a FIRST submission of items concerning a filing under 35 U.S.C. 371. 2. <input type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371. 3. <input type="checkbox"/> This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (24) indicated below. 4. <input checked="" type="checkbox"/> The US has been elected by the expiration of 19 months from the priority date (Article 31). 5. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371 (c) (2)) <ol style="list-style-type: none"> a. <input checked="" type="checkbox"/> is attached hereto (required only if not communicated by the International Bureau). b. <input type="checkbox"/> has been communicated by the International Bureau. c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US). 6. <input checked="" type="checkbox"/> An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)). <ol style="list-style-type: none"> a. <input checked="" type="checkbox"/> is attached hereto. b. <input type="checkbox"/> has been previously submitted under 35 U.S.C. 154(d)(4). 7. <input checked="" type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3)) <ol style="list-style-type: none"> a. <input type="checkbox"/> are attached hereto (required only if not communicated by the International Bureau). b. <input type="checkbox"/> have been communicated by the International Bureau. c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired. d. <input checked="" type="checkbox"/> have not been made and will not be made. 8. <input type="checkbox"/> An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)). 9. <input type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)). 10. <input type="checkbox"/> An English language translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)). 11. <input checked="" type="checkbox"/> A copy of the International Preliminary Examination Report (PCT/IPEA/409). 12. <input checked="" type="checkbox"/> A copy of the International Search Report (PCT/ISA/210). <p>Items 13 to 20 below concern document(s) or information included:</p> <ol style="list-style-type: none"> 13. <input checked="" type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98. 14. <input type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included 15. <input checked="" type="checkbox"/> A FIRST preliminary amendment. 16. <input type="checkbox"/> A SECOND or SUBSEQUENT preliminary amendment. 17. <input checked="" type="checkbox"/> A substitute specification. 18. <input type="checkbox"/> A change of power of attorney and/or address letter. 19. <input type="checkbox"/> A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825. 20. <input type="checkbox"/> A second copy of the published international application under 35 U.S.C. 154(d)(4). 21. <input type="checkbox"/> A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4). 22. <input checked="" type="checkbox"/> Certificate of Mailing by Express Mail 23. <input type="checkbox"/> Other items or information: 					

531 Rec'd PCT/PTO 14 JAN 2002

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR 1.101) 10/031300		INTERNATIONAL APPLICATION NO. PCT/DE00/01109		ATTORNEY'S DOCKET NUMBER 112740-514	
---	--	--	--	---	--

24. The following fees are submitted:				CALCULATIONS PTO USE ONLY	
BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)) : <input type="checkbox"/> Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report prepared by the EPO or JPO \$1040.00 <input checked="" type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO \$890.00 <input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO \$740.00 <input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) \$710.00 <input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) \$100.00				\$890.00	
ENTER APPROPRIATE BASIC FEE AMOUNT =				\$890.00	
Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492 (e)).				\$0.00	
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	3 - 20 =	0	x \$18.00	\$0.00	
Independent claims	3 - 3 =	0	x \$84.00	\$0.00	
Multiple Dependent Claims (check if applicable). <input type="checkbox"/>				\$0.00	
TOTAL OF ABOVE CALCULATIONS =				\$890.00	
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27). The fees indicated above are reduced by 1/2.				\$0.00	
SUBTOTAL =				\$890.00	
Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492 (f)).				\$0.00	
TOTAL NATIONAL FEE =				\$890.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) (check if applicable). <input type="checkbox"/>				\$0.00	
TOTAL FEES ENCLOSED =				\$890.00	
				Amount to be: refunded	\$
				charged	\$

a. ☒ A check in the amount of **\$890.00** to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account No. _____ in the amount of _____ to cover the above fees. A duplicate copy of this sheet is enclosed.

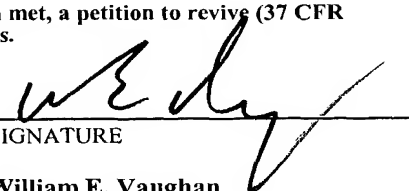
c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. **02-1818**. A duplicate copy of this sheet is enclosed.

d. ☐ Fees are to be charged to a credit card. **WARNING:** Information on this form may become public. **Credit card information should not be included on this form.** Provide credit card information and authorization on PTO-2038.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

William E. Vaughan (Reg. No. 39,056)
 Bell, Boyd & Lloyd LLC
 P.O. Box 1135
 Chicago, Illinois 60690-1135


 SIGNATURE
 William E. Vaughan
 NAME
 39,056
 REGISTRATION NUMBER
 January 14, 2002
 DATE

107031300

531 Rec'd PCT/ 14 JAN 2002

BOX PCT

IN THE UNITED STATES ELECTED/DESIGNATED OFFICE
OF THE UNITED STATES PATENT AND TRADEMARK OFFICE
UNDER THE PATENT COOPERATION TREATY-CHAPTER II

5

PRELIMINARY AMENDMENT

APPLICANTS: Ralf Schoebel et al. DOCKET NO.: 112740-514
SERIAL NO: GROUP ART UNIT:
FILED: EXAMINER:
INTERNATIONAL APPLICATION NO.: PCT/DE00/01109
INTERNATIONAL FILING DATE 11 April 2000
INVENTION: HETERODYNE MOBILE RADIO RECEIVER WITH
SIMPLIFIED INPUT FILTERING

Assistant Commissioner for Patents,
Washington, D.C. 20231

10

Sir:

Please amend the above-identified International Application before entry
into the National stage before the U.S. Patent and Trademark Office under 35
U.S.C. §371 as follows:

15 **In the Specification:**

Please replace the Specification of the present application, including the
Abstract, with the following Substitute Specification:

SPECIFICATION

TITLE OF THE INVENTION

20 HETERODYNE MOBILE RADIO RECEIVER WITH SIMPLIFIED INPUT
FILTERING

BACKGROUND OF THE INVENTION

25 In heterodyne mobile radio receivers, there is a spurious response position
at the image frequency. At this spurious response position, the receiver has
approximately the same sensitivity as at the useful frequency. To prevent
interference, very strong filtering is required at this frequency. This is 71 dB, e.g.,
in the GSM 900 system. For this purpose, two ceramic filters or two surface
acoustic wave filters have, to date, normally been used. In the previous solution,

these are typically designed as bandpass filters which are used for suppressing the image frequency. In the technology previously available, the selectivity of a single bandpass filter was insufficient at the image frequency which is why two bandpass filters had to be used.

5 A first bandpass filter (FF), the front-end filter, usually had less selectivity and lower insertion loss in the useful band and was placed in front of the low-noise preamplifier (LNA). A second bandpass filter (IF), the so-called interstage filter, has higher selectivity and was placed between the preamplifier and the first mixer. This use of two bandpass filters in the front-end and interstage area made it
10 possible to achieve adequate selectivity at the image frequency.

The present invention is directed toward specifying a solution to this problem which is as inexpensive as possible and which also is associated with a smaller space requirement than the known solutions involving two bandpass filters.

SUMMARY OF THE INVENTION

15 Accordingly, in an embodiment of the present invention, a heterodyne mobile radio receiver is provided which includes a highly selective front-end filter preceding a low-noise input amplifier, and a high-pass filter which follows the low-noise input amplifier and precedes a first mixing stage.

In an embodiment, the heterodyne mobile radio receiver includes a highly
20 selective front-end filter preceding a low-noise input amplifier, and a low-pass filter which follows the low-noise input amplifier and precedes a first mixing stage.

In a further embodiment, the heterodyne mobile radio receiver includes a highly selective front-end filter preceding a low-noise input amplifier, and an
25 offset compensation part which follows the low-noise input amplifier and precedes a first mixing stage.

Additional features and advantages of the present invention are described in, and will be apparent from, the following Detailed Description of the Invention and the Figures.

30 BRIEF DESCRIPTION OF THE FIGURES

Figure 1 diagrammatically shows the configuration of a heterodyne receiver according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Due to more recent developments in the field of bandpass filters, modern
 5 bandpass filters have, at present, a higher selectivity at the image frequency than
 was previously achievable. Extensive trials and simulations by the inventors have
 shown that it is possible to configure a heterodyne receiver in a simplified manner
 via bandpass filters of this novel type. For this purpose use is made of a bandpass
 filter having a very high adjacent-channel selectivity such as previously has been
 10 used in principle as interstage filter; i.e., as bandpass filter between the
 preamplifier and the first mixing stage. However, the novel front-end filter
 according to the present invention is distinguished by extremely high adjacent-
 channel selectivity which previously has not been available.

By using such a front-end filter, it is sufficient to use a simple low-pass
 15 filter or also a high-pass filter in the interstage area; i.e., between the low-noise
 preamplifier and the first mixing stage. Another possibility consists in replacing
 the remaining filtering still necessary via offset compensation in software. The
 solution according to the present invention is also made possible due to the fact
 that more recent bandpass filters of this type also meet the power compatibility
 20 requirements which must be set for a surface acoustic wave filter to be used in the
 front-end area in the GSM area.

Previously, that is to say before the present invention, mobile radio
 receivers could be implemented with a bandpass filter only if the receiver was
 configured as a homodyne receiver or if so-called image-rejection mixers were
 25 used which, however, have higher current consumption. These disadvantages can
 be avoided via the solution according to the present invention and it is possible to
 achieve a decisive advantage in costs and an advantage in space.

In principle, as shown in Figure 2, heterodyne radio receivers, particularly
 heterodyne mobile radio receivers, were configured as follows.

30 The output signal of an antenna was supplied to a front-end filter which
 preceded a preamplifier which, typically, had very low noise characteristics. The

output signal of this low-noise preamplifier was supplied to an interstage filter, the output signal of which, in turn, was supplied to the first mixing stage (first mixer).

In this arrangement, the front-end filter in the usual type of construction is normally distinguished by lower selectivity and less insertion loss in the useful
5 band whereas the interstage filter had higher selectivity.

According to the present invention, the novel heterodyne radio receiver shown in Figure 1 is now configured in simplified manner due to the fact that a highly selective bandpass filter is used as front-end filter. The filter characteristics of the highly selective bandpass filter are so good that now only a high-pass filter
10 or a low-pass filter is required in the interstage area; that is to say, between the low-noise preamplifier and the first mixer.

Instead of this low-pass or high-pass filter in the interstage area, offset compensation in software is also possible.

Although the present invention has been described with reference to
15 specific embodiments, those of skill in the art will recognize that changes may be made thereto without departing from the spirit and scope of the invention as set forth in the hereafter appended claims.

ABSTRACT OF THE DISCLOSURE

A simplified configuration of a heterodyne radio receiver which provides for a front-end filter having higher selectivity in the image frequency area, the adjacent-channel selectivity of which is so significant that a simple high-pass filter
5 or low-pass filter is sufficient in the interstage area. As an alternative to this simple high-pass or low-pass filter, offset compensation in software is also possible. Due to this simplified configuration, distinct advantages with regard to costs and space can be achieved.

In the claims:

On page 4, cancel line 1, and substitute the following left-hand justified heading therefor:

CLAIMS:

5 Please cancel claims 1-3, without prejudice, and substitute the following claims therefor:

4. A heterodyne mobile radio receiver, comprising:

a highly selective front-end filter preceding a low-noise input amplifier;

and

10 a high-pass filter which follows the low-noise input amplifier and precedes a first mixing stage.

5. A heterodyne mobile radio receiver, comprising:

a highly selective front-end filter preceding a low-noise input amplifier;

15 and

a low-pass filter which follows the low-noise input amplifier and precedes a first mixing stage.

6. A heterodyne mobile radio receiver, comprising:

20 a highly selective front-end filter preceding a low-noise input amplifier;

and

an offset compensation part which follows the low-noise input amplifier and precedes a first mixing stage.

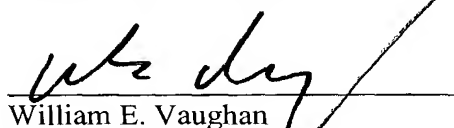
25 **REMARKS**

The present amendment makes editorial changes and corrects typographical errors in the specification, which includes the Abstract, in order to conform the specification to the requirements of United States Patent Practice. No new matter is added thereby. Attached hereto is a marked-up version of the changes made to
30 the specification by the present amendment. The attached page is captioned **"Version With Markings To Show Changes Made"**.

In addition, the present amendment cancels original claims 1-3 in favor of new claims 4-6. Claims 4-6 have been presented solely because the revisions by red-lining and underlining which would have been necessary in claims 1-3 in order to present those claims in accordance with preferred United States Patent Practice would have been too extensive, and thus would have been too burdensome. The present amendment is intended for clarification purposes only and not for substantial reasons related to patentability pursuant to 35 U.S.C. §§101, 102, 103 or 112. Indeed, the cancellation of claims 1-3 does not constitute an intent on the part of the Applicants to surrender any of the subject matter of claims 1-3.

Early consideration on the merits is respectfully requested.

Respectfully submitted,



(Reg. No. 39,056)

William E. Vaughan
Bell, Boyd & Lloyd LLC
P.O. Box 1135
Chicago, Illinois 60690-1135
(312) 807-4292
Attorneys for Applicants

VERSIONS WITH MARKINGS TO SHOW CHANGES MADE

In The Specification:

The Specification of the present application, including the Abstract, has been amended as follows:

5 Description

SPECIFICATION

~~Heterodyne mobile radio receiver with simplified input filtering~~

TITLE OF THE INVENTION

HETERODYNE MOBILE RADIO RECEIVER WITH SIMPLIFIED INPUT

10

FILTERING

BACKGROUND OF THE INVENTION

In heterodyne mobile radio receivers, there is a spurious response position at the image frequency. At this spurious response position, the receiver has approximately the same sensitivity as at the useful frequency. To prevent interference, very strong filtering is required at this frequency. This is 71 dB, e.g., in the GSM 900 system. For this purpose, two ceramic filters or two surface acoustic wave filters have ~~been hitherto, to date,~~ normally been used. In the previous solution, these are typically designed as bandpass filters which are used for suppressing the image frequency. In the technology ~~hitherto~~ previously available, the selectivity of a single bandpass filter was insufficient at the image frequency which is why two bandpass filters had to be used.

A first bandpass filter (FF), the front-end filter, usually had less selectivity and lower insertion loss in the useful band and was placed in front of the low-noise preamplifier (LNA). A second bandpass filter (IF), the so-called interstage filter, has higher selectivity and was placed between the preamplifier and the first mixer. This use of two bandpass filters in the front-end and interstage area made it possible to achieve adequate selectivity at the image frequency.

The present invention is ~~based on the object of~~ directed toward specifying a solution to this problem which is as inexpensive as possible and which also is associated with a smaller space requirement than the known solutions involving two bandpass filters. ~~According to the invention, this object is achieved by means~~

of a heterodyne mobile radio receiver having features according to one of the independent claims.

SUMMARY OF THE INVENTION

Accordingly, in an embodiment of the present invention, a heterodyne mobile radio receiver is provided which includes a highly selective front-end filter preceding a low-noise input amplifier, and a high-pass filter which follows the low-noise input amplifier and precedes a first mixing stage.

In an embodiment, the heterodyne mobile radio receiver includes a highly selective front-end filter preceding a low-noise input amplifier, and a low-pass filter which follows the low-noise input amplifier and precedes a first mixing stage.

In a further embodiment, the heterodyne mobile radio receiver includes a highly selective front-end filter preceding a low-noise input amplifier, and an offset compensation part which follows the low-noise input amplifier and precedes a first mixing stage.

Additional features and advantages of the present invention are described in, and will be apparent from, the following Detailed Description of the Invention and the Figures.

BRIEF DESCRIPTION OF THE FIGURES

Figure 1 diagrammatically shows the configuration of a heterodyne receiver according to the present invention.

Figure 2 diagrammatically shows the configuration of a heterodyne receiver previously used.

In the text which follows, the invention will be described in greater detail with the aid of preferred exemplary embodiments and by means of the figures.

DETAILED DESCRIPTION OF THE INVENTION

Due to more recent developments in the field of bandpass filters, modern bandpass filters have, at present, a higher selectivity at the image frequency than was previously achievable. Extensive trials and simulations by the inventors have shown that it is possible to configure a heterodyne receiver in a simplified manner by means of via bandpass filters of this novel type. For this purpose use is made of a bandpass filter having a very high adjacent-channel selectivity such as has

previously has been used in principle as interstage filter; i.e., as bandpass filter between the preamplifier and the first mixing stage, ~~however.~~ However, the novel front-end filter according to the present invention is distinguished by extremely high adjacent-channel selectivity which ~~has~~ previously has not been available.

5 By using such a front-end filter, it is sufficient to use a simple low-pass filter or also a high-pass filter in the interstage area; i.e., between the low-noise preamplifier and the first mixing stage. Another possibility consists in replacing the remaining filtering still necessary ~~by means of~~ via offset compensation in software. The solution according to the present invention is also made possible
10 due to the fact that more recent bandpass filters of ~~the said~~ this type also meet the power compatibility requirements which must be set for a surface acoustic wave filter to be used in the front-end area in the GSM area.

Previously, that is to say before the present invention, mobile radio receivers could be implemented with a bandpass filter only if the receiver was
15 configured as a homodyne receiver or if so-called image-rejection mixers were used which, however, have higher current consumption. These disadvantages can be avoided ~~by means of~~ via the solution according to the present invention and it is possible to achieve a decisive advantage in costs and an advantage in space.

In principle, as shown in Ffigure 2, heterodyne radio receivers, particularly
20 heterodyne mobile radio receivers, were configured as follows.

The output signal of an antenna was supplied to a front-end filter which preceded a preamplifier which, typically, had very low noise characteristics. The output signal of this low-noise preamplifier was supplied to an interstage filter, the output signal of which, in turn, was supplied to the first mixing stage (first mixer).

25 In this arrangement, the front-end filter in the usual type of construction is normally distinguished by lower selectivity and less insertion loss in the useful band whereas the interstage filter had higher selectivity.

According to the present invention, the novel heterodyne radio receiver shown in Ffigure 1 is now configured in simplified manner due to the fact that a
30 highly selective bandpass filter is used as front-end filter, ~~the.~~ The filter characteristics of ~~which~~ the highly selective bandpass filter are so good that now

only a high-pass filter or a low-pass filter is required in the interstage area₂ that is to say₁ between the low-noise preamplifier and the first mixer.

Instead of this low-pass or high-pass filter in the interstage area, offset compensation in software is also possible.

- 5 Although the present invention has been described with reference to specific embodiments, those of skill in the art will recognize that changes may be made thereto without departing from the spirit and scope of the invention as set forth in the hereafter appended claims.

ABSTRACT OF THE DISCLOSURE

5 The A simplified configuration of a heterodyne radio receiver which provides for a front-end filter (FF) having higher selectivity in the image frequency area, the adjacent-channel selectivity of which is so significant, that a simple high-pass filter or low-pass filter is sufficient in the interstage area. As an alternative to this simple high-pass or low-pass filter, offset compensation in software is also possible. Due to this simplified configuration, distinct advantages with regard to costs and space can be achieved.

2/PRTS

10/031300
531 Rec'd PGT/F 14 JAN 2002

GR 99 P 2304

Description

Heterodyne mobile radio receiver with simplified input filtering

5

In heterodyne mobile radio receivers, there is a spurious response position at the image frequency. At this spurious response position, the receiver has approximately the same sensitivity as at the useful
10 frequency. To prevent interference, very strong filtering is required at this frequency. This is 71 dB, e.g. in the GSM 900 system. For this purpose, two ceramic filters or two surface acoustic wave filters have been hitherto normally used. In the previous
15 solution, these are typically designed as bandpass filters which are used for suppressing the image frequency. In the technology hitherto available, the selectivity of a single bandpass filter was insufficient at the image frequency which is why two
20 bandpass filters had to be used.

A first bandpass filter (FF), the front-end filter, usually had less selectivity and lower insertion loss in the useful band and was placed in front of the low-
25 noise preamplifier (LNA). A second bandpass filter (IF), the so-called interstage filter, has higher selectivity and was placed between the preamplifier and the first mixer. This use of two bandpass filters in the front-end and interstage area made it possible to
30 achieve adequate selectivity at the image frequency.

The invention is based on the object of specifying a solution to this problem which is as inexpensive as possible and which also is associated with a smaller
35 space requirement than the known solutions involving two bandpass filters. According to the invention, this object is achieved by means of a heterodyne mobile

[illegible][illegible][illegible]

Figure 1 diagrammatically shows the configuration of a heterodyne receiver according to the invention.

5 Figure 2 diagrammatically shows the configuration of a heterodyne receiver previously used.

In the text which follows, the invention will be described in greater detail with the aid of preferred exemplary embodiments and by means of the figures.

10

Due to more recent developments in the field of bandpass filters, modern bandpass filters have at present a higher selectivity at the image frequency than was previously achievable. Extensive trials and
15 simulations by the inventors have shown that it is possible to configure a heterodyne receiver in a simplified manner by means of bandpass filters of this novel type. For this purpose use is made of a bandpass filter having a very high adjacent-channel selectivity
20 such as has previously been used in principle as interstage filter, i.e. as bandpass filter between the preamplifier and the first mixing stage, however, the novel front-end filter according to the invention is distinguished by extremely high adjacent-channel
25 selectivity which has previously not been available.

By using such a front-end filter, it is sufficient to use a simple low-pass filter or also a high-pass filter in the interstage area, i.e. between the low-noise
30 preamplifier and the first mixing stage. Another possibility consists in replacing the remaining filtering still necessary by means of offset compensation in software. The solution according to the invention is also made possible due to the fact that
35 more recent bandpass filters of the said type also meet the power compatibility requirements which must be set for a surface acoustic wave filter to be used in the front-end area in the GSM area.

GR 99 P 2304

- 3a -

interstage area, offset compensation in software is
also possible.

Patent Claims

1. A heterodyne radio receiver, particularly a mobile
radio receiver, comprising a highly selective
5 front-end filter preceding the low-noise input
amplifier and a high-pass filter which follows the
low-noise input amplifier and precedes the first
mixing stage.
- 10 2. A heterodyne radio receiver, particularly mobile
radio receiver, comprising a highly selective
front-end filter preceding the low-noise input
amplifier and a low-pass filter which follows the
15 low-noise input amplifier and precedes the first
mixing stage.
3. The heterodyne radio receiver as claimed in one of
the preceding claims, comprising a highly
selective front-end filter preceding the low-noise
20 input amplifier and offset compensation instead of
the high-pass or low-pass filter, which follows
the low-noise input amplifier and precedes the
first mixing stage.

GR 99 P 2304

Abstract

Heterodyne mobile radio receiver with simplified input filtering

The simplified configuration of a heterodyne radio receiver provides for a front-end filter (FF) having higher selectivity in the image frequency area, the adjacent-channel selectivity of which is so significant, that a simple high-pass filter or low-pass filter is sufficient in the interstage area. As an alternative to this simple high-pass or low-pass filter, offset compensation in software is also possible. Due to this simplified configuration, distinct advantages with regard to costs and space can be achieved.

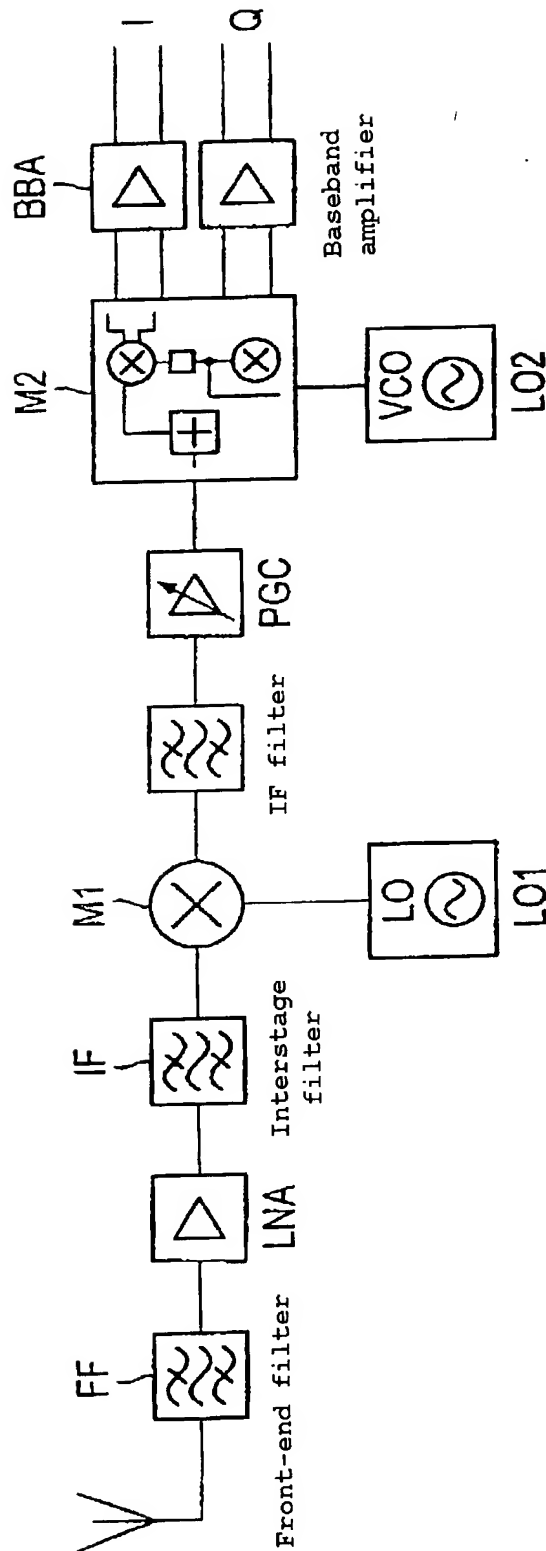
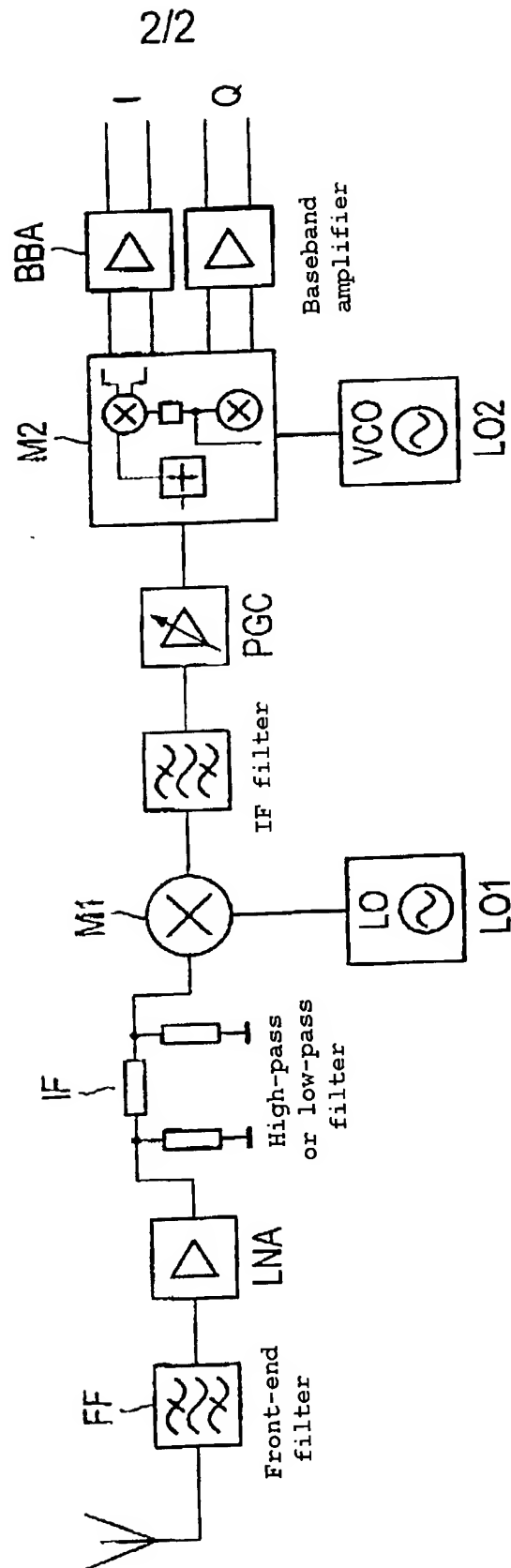
$\frac{1}{2}$ 

FIG 2



Declaration and Power of Attorney For Patent Application

Erklärung Für Patentanmeldungen Mit Vollmacht

German Language Declaration

Als nachstehend benannter Erfinder erkläre ich hiermit an Eides Statt:

dass mein Wohnsitz, meine Postanschrift, und meine Staatsangehörigkeit den im Nachstehenden nach meinem Namen aufgeführten Angaben entsprechen,

dass ich, nach bestem Wissen der ursprüngliche, erste und alleinige Erfinder (falls nachstehend nur ein Name angegeben ist) oder ein ursprünglicher, erster und Miterfinder (falls nachstehend mehrere Namen aufgeführt sind) des Gegenstandes bin, für den dieser Antrag gestellt wird und für den ein Patent beantragt wird für die Erfindung mit dem Titel:

Heterodyner Mobilfunkempfänger mit vereinfachter Eingangsfilterung

deren Beschreibung

(zutreffendes ankreuzen)

☐ hier beigefügt ist.

☒ am 11.04.2000 als

PCT internationale Anmeldung

PCT Anmeldungsnummer PCT/DE00/01109

eingereicht wurde und am

abgeändert wurde (falls tatsächlich abgeändert).

Ich bestätige hiermit, dass ich den Inhalt der obigen Patentanmeldung einschliesslich der Ansprüche durchgesehen und verstanden habe, die eventuell durch einen Zusatzantrag wie oben erwähnt abgeändert wurde.

Ich erkenne meine Pflicht zur Offenbarung irgendwelcher Informationen, die für die Prüfung der vorliegenden Anmeldung in Einklang mit Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) von Wichtigkeit sind, an.

Ich beanspruche hiermit ausländische Prioritätsvorteile gemäss Abschnitt 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 119 aller unten angegebenen Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde, und habe auch alle Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde nachstehend gekennzeichnet, die ein Anmeldedatum haben, das vor dem Anmeldedatum der Anmeldung liegt, für die Priorität beansprucht wird

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

Heterodyne mobile radio telephone receiver having simplified input filtering

the specification of which

(check one)

☐ is attached hereto.

☒ was filed on 11.04.2000 as

PCT international application

PCT Application No. PCT/DE00/01109

and was amended on

(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

German Language Declaration

Prior foreign applications
Priorität beansprucht

Priority Claimed

19933267.3

DE

15.07.1999

☒

☐

(Number)
(Nummer)

(Country)
(Land)

(Day Month Year Filed)
(Tag Monat Jahr eingereicht)

Yes
Ja

No
Nein

(Number)
(Nummer)

(Country)
(Land)

(Day Month Year Filed)
(Tag Monat Jahr eingereicht)

☐
Yes
Ja

☐
No
Nein

(Number)
(Nummer)

(Country)
(Land)

(Day Month Year Filed)
(Tag Monat Jahr eingereicht)

☐
Yes
Ja

☐
No
Nein

Ich beanspruche hiermit gemäss Absatz 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 120, den Vorzug aller unten aufgeführten Anmeldungen und falls der Gegenstand aus jedem Anspruch dieser Anmeldung nicht in einer früheren amerikanischen Patentanmeldung laut dem ersten Paragraphen des Absatzes 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 122 offenbart ist, erkenne ich gemäss Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) meine Pflicht zur Offenbarung von Informationen an, die zwischen dem Anmeldedatum der früheren Anmeldung und dem nationalen oder PCT internationalen Anmeldedatum dieser Anmeldung bekannt geworden sind.

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §122, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application.

PCT/DE00/01109

(Application Serial No.)
(Anmeldeseriennummer)

11.04.2000

(Filing Date D, M, Y)
(Anmeldedatum T, M, J)

anhängig

(Status)
(patentiert, anhängig,
aufgegeben)

pending

(Status)
(patented, pending,
abandoned)

(Application Serial No.)
(Anmeldeseriennummer)

(Filing Date D,M,Y)
(Anmeldedatum T, M; J)

(Status)
(patentiert, anhängig,
aufgeben)

(Status)
(patented, pending,
abandoned)

Ich erkläre hiermit, dass alle von mir in der vorliegenden Erklärung gemachten Angaben nach meinem besten Wissen und Gewissen der vollen Wahrheit entsprechen, und dass ich diese eidesstattliche Erklärung in Kenntnis dessen abgebe, dass wissentlich und vorsätzlich falsche Angaben gemäss Paragraph 1001, Absatz 18 der Zivilprozessordnung der Vereinigten Staaten von Amerika mit Geldstrafe belegt und/oder Gefängnis bestraft werden können, und dass derartig wissentlich und vorsätzlich falsche Angaben die Gültigkeit der vorliegenden Patentanmeldung oder eines darauf erteilten Patentes gefährden können.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

German Language Declaration

VERTRETUNGSVOLLMACHT: Als benannter Erfinder beauftrage ich hiermit den nachstehend benannten Patentanwalt (oder die nachstehend benannten Patentanwälte) und/oder Patent-Agenten mit der Verfolgung der vorliegenden Patentanmeldung sowie mit der Abwicklung aller damit verbundenen Geschäfte vor dem Patent- und Warenzeichenamt: (Name und Registrationsnummer anführen)

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (list name and registration number).



29177

And I hereby appoint
PATENT TRADEMARK OFFICE

Customer No. 29177

Telefongespräche bitte richten an:
(Name und Telefonnummer)

Direct Telephone Calls to: (name and telephone number)

Ext. _____

Postanschrift:

Send Correspondence to:

Bell, Boyd & Lloyd LLC
Three First National Plaza, 70 West Madison Street, Suite 3300 60602-4207 Chicago, Illinois
Telephone: (001) 312 372 11 21 and Facsimile (001) 312 827 8185

or

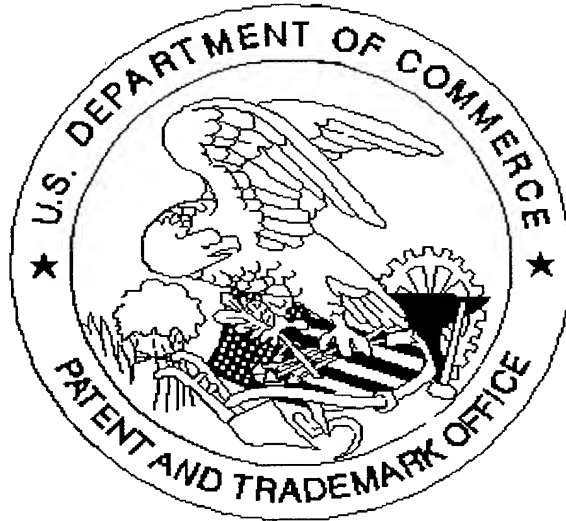
Customer No. 29177

Voller Name des einzigen oder ursprünglichen Erfinders:		Full name of sole or first inventor:	
RALF SCHOEBEL 1 - 00		RALF SCHOEBEL	
Unterschrift des Erfinders	Datum	Inventor's signature	Date
<i>Ralf Schoebel</i>	19.12.01		
Wohnsitz		Residence	
ASCHAU, DEUTSCHLAND		ASCHAU, GERMANY <i>DEX</i>	
Staatsangehörigkeit		Citizenship	
DE		DE	
Postanschrift		Post Office Address	
WIESENGRUNDSTR. 55		WIESENGRUNDSTR. 55	
83229 ASCHAU		83229 ASCHAU	
Voller Name des zweiten Miterfinders (falls zutreffend)		Full name of second joint inventor, if any:	
MICHAEL WILHELM 2 - 00		MICHAEL WILHELM	
Unterschrift des Erfinders	Datum	Second Inventor's signature	Date
<i>M. Wilhelm</i>	3.5.02		
Wohnsitz		Residence	
FUERSTENFELDBRUCK, DEUTSCHLAND		FUERSTENFELDBRUCK, GERMANY <i>DEX</i>	
Staatsangehörigkeit		Citizenship	
DE		DE	
Postanschrift		Post Office Address	
SCHILLERSTR. 23		SCHILLERSTR. 23	
82256 FUERSTENFELDBRUCK		82256 FUERSTENFELDBRUCK	

(Bitte entsprechende Informationen und Unterschriften im Falle von dritten und weiteren Miterfindern angeben).

(Supply similar information and signature for third and subsequent joint inventors).

United States Patent & Trademark Office
Office of Initial Patent Examination -- Scanning Division



Application deficiencies found during scanning:

☒ Page(s) _____ of Certificate of mail were not present
for scanning. (Document title)

☐ Page(s) _____ of _____ were not present
for scanning. (Document title)

☐ *Scanned copy is best available.*